Patent claims Rec'd PCT/PTO 21 DEC 2004

1.

A device for recognising a container by means of a marking provided on its surface, comprising a camera and light emission means (1, 2, 3; 11, 12, 13) arranged for imaging the marking (4; 14) on the container (5; 15), said camera and light emission means being connected to a processor or the like adapted for recognition, based on a camera-recorded image of the marking, of distinctive features related to the container, and wherein the camera and light emission means faces the marking during the imaging process, characterised in that the camera and light emission means consists of one camera (1; 11) and at least two light sources (2, 3; 12, 13), the light sources being positioned in such manner, either on the same or on each side of the camera, that light emitted from the respective light source falls in from a different direction relative to the marking, and that the camera and light emission means is so controlled by the processor that the camera can take at least two images of the marking using light emitted successively from the respective light source or the selectively chosen light source group.

2.

A device for recognising a container by means of a marking provided on its surface, comprising a camera and light emission means (31, 32, 33; 41, 42, 43) arranged for imaging the marking (34; 44) on the container (35; 45), said camera and light emission means being connected to a processor or the like adapted for recognition, based on a camera-recorded image of the marking, of distinctive features related to the container, and wherein the camera and light emission means faces the marking during the imaging process, characterised in that the camera and light emission means consists of at least two cameras (31, 32; 41, 42) and one light source (33; 43), the cameras being positioned in such manner, either on the same or on each side of the light source, that the optical axis of the respective camera falls in from a different direction relative to the marking, and that the camera and light emission means is so controlled by the processor that the cameras or the selectively chosen camera group can take at least two images of the marking simultaneously.

3.

A device for recognising a container by means of a marking provided on its surface, comprising a camera and light emission means consisting of one camera (62) and at least one light source (63), and which is arranged for imaging the marking (64) on the

container (65), said camera and light emission means being connected to a processor or the like adapted for recognition, based on a camera-recorded image of the marking, of distinctive features related to the container, characterised by an assembly of mirror faces (67, 68, 69, 70) which in pairs are positioned relative to one another in such manner that the camera can take two images of the marking (64) simultaneously, the mirror faces in the respective pairs being positioned on the same side of the optical axis of the camera and are facing each other, with one of the mirror faces (67, 68) adjacent to the optical axis, and that the camera (62), during the imaging process, is pointed towards the mirror faces adjacent to the optical axis, in which the marking is shown as two mirror images seen from different directions.

4.

A device according to claim 1 or 2, characterised in that the camera (1; 11), or the light source (33; 43) is placed at a level above the container (5; 15; 35; 45).

5.

A device according to claim 1, characterised in that when the marking (4) is provided in an end face of the container (5), the camera (1) and the light sources (2, 3) are interpositioned so as to fulfil the expression:

$$\alpha \geq \beta + \gamma, \quad \text{wherein}$$

α is the angle between the two lines drawn from the centre point of the end face on of the container to the centre point of each light source;

β is the angle between the line drawn from the centre point of the outer light source to the outer edges of the end faces of the container along the respective diameter; and

γ is the angle between the two lines drawn from the centre point of the camera lens to each outer edge of the container along the respective diameter.

6.

A device according to claim 2, characterised in that when the marking (34) is provided in an end face of the container (35), the cameras (31, 32) and the light source (33) are interpositioned so as to fulfil the expression:

$$\alpha \geq \beta + \gamma, \quad \text{wherein}$$

α is the angle between the two lines drawn from the centre point of the end face on of the container to the centre point of each camera;

β is the angle between the line drawn from the centre point of the outer camera lens to the outer edges of the end face of the container along the respective diameter; and

γ is the angle between the two lines drawn from the centre point of the light source to each outer edge of the container along the respective diameter.

7.

A device according to claim 1, characterised in that the respective light sources (2, 3) emit light that is synchronised with the exposures of the camera (1).

8.

A device according to claim 2, characterised in that the light source (33) emits light that is synchronised with the exposure of the respective cameras (31, 32).

9.

A device according to claim 1, 2 or 3, characterised in that the light is short-pulsed light.

10.

A device according to claim 1, 2 or 3, characterised in that the light source (2, 3; 33) consists of at least one light-emitting diode.

11.

A device according to claim 3, characterised in that the line of intersection between the mirror faces (67, 68) adjacent to the optical axis of the camera is essentially perpendicular to the optical axis, these mirror faces being symmetrically positioned and directed in the opposite direction to each other.

12.

A device according to claim 11, characterised in that the mirror faces adjacent to the optical axis of the camera are so positioned that one of their sides edges meet.

13.

A device according to claim 11, characterised in that the mirror faces adjacent to the optical axis of the camera are offset relative to each other along the optical axis.

14.

A device according to any one of the preceding claims, characterised in that the imaging is performed when the container (5; 35; 65) is on a conveyor (6; 36; 66) installed in a reverse vending machine for beverage containers.

15.

A device according to any one of the preceding claims, characterised in that the processor comprises a comparator designed for recognition, based on the image selected by the processor, of the marking on the container (5; 35; 65) by comparing with a reference archive of markings and thus recognising distinctive features related to the container.